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January 31, 2006

Mr. Russell Hart  
United States Environmental Protection Agency  
Region V  
77 West Jackson Boulevard  
Chicago, Illinois 60604-3590

RE: Horizontal Groundwater Monitoring Well Installation and Testing Work Plan  
Area 9/10, Remedial Design  
Southeast Rockford Groundwater Contamination Superfund Site  
Rockford, Illinois

Dear Mr. Hart:

On behalf of Hamilton Sundstrand (HS), SECOR International Incorporated (SECOR) has prepared the enclosed work plan which provides details of the proposed horizontal groundwater monitoring well installation and testing procedures. The work plan provides information on the site background, necessary preparation activities, well installation technology and methods, groundwater sampling procedures, and the documentation of the activities to be submitted to the United States Environmental Protection Agency (USEPA) and the Illinois Environmental Protection Agency (IEPA). The purpose of this proposed effort is to better determine the location of potential source areas beneath the building. The proposed horizontal well would also likely serve as a remediation system performance monitoring point.

As discussed with you in a telephone conversation earlier this month there are some changing conditions at this facility. At this time a HS corporate business decision has been made to reduce the size of the building footprint, the level of future manufacturing activities, and the number of personnel at the facility. These changes will likely take place over the next eighteen months. A specific timetable has not yet been developed, however. It is envisioned that, as a result of the realignment of the facility and reduction in the building footprint, greater access to potential source areas may be available.


This work plan has been prepared and submitted consistent with a commitment made by HS to keep the remedial design activities moving forward. With better access to potential source areas likely to become available, we are presently evaluating other site investigation means to cost effectively identify potential source areas (ie. vertical wells within the building footprint). We will keep the USEPA informed as the actual timeframe of the manufacturing capacity reduction and partial building demolition activities unfold. In tandem with these activities, HS will evaluate other options and may elect to develop an alternate plan for identifying potential source areas for the remedial design activities as the site constraints presented by the presence of the building and its manufacturing activities are changing.

It is desired that USEPA and HS keep an open dialogue regarding the performance and timing of the continued source identification and remedial design activities for Area 9/10.

Mr. Russell Hart  
RE: Horizontal Groundwater Monitoring Well Installation and Testing Work Plan  
January 31, 2006  
Page 2

We appreciate the USEPA's cooperation and involvement in keeping the Area 9/10 Remedial Design effort moving on an appropriate course. As always, if you have any questions, please do not hesitate to call.

Sincerely,  
SECOR International Incorporated

A handwritten signature in black ink, appearing to read "David M. Curnock". The signature is fluid and cursive, with the first name "David" being the most prominent.

David M. Curnock  
Principal Scientist

Enclosure: Horizontal Groundwater Monitoring Well Installation and Testing Work Plan

cc: Mr. Scott Moyer, HS/UTC  
Ms. Kathleen McFadden, UTC  
Mr. Brian Yeich, UTC  
Mr. Thomas Turner, USEPA  
Mr. Thomas Williams, IEPA  
Mr. Terry Ayers, IEPA

# Horizontal Groundwater Monitoring Well Installation and Testing Work Plan

## Remedial Design

Southeast Rockford Groundwater Contamination  
Superfund Site

Area 9/10, Rockford, IL

CERCLIS ID No. IL9801000417

January 31, 2006

Prepared for:

**Hamilton Sundstrand Corporation**

4747 Harrison Avenue  
Rockford, Illinois 61125

Submitted by:



**SECOR**

**SECOR International Incorporated**

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Lombard, Illinois 60148

SECOR Project No.: 13UN.02072.06.0001

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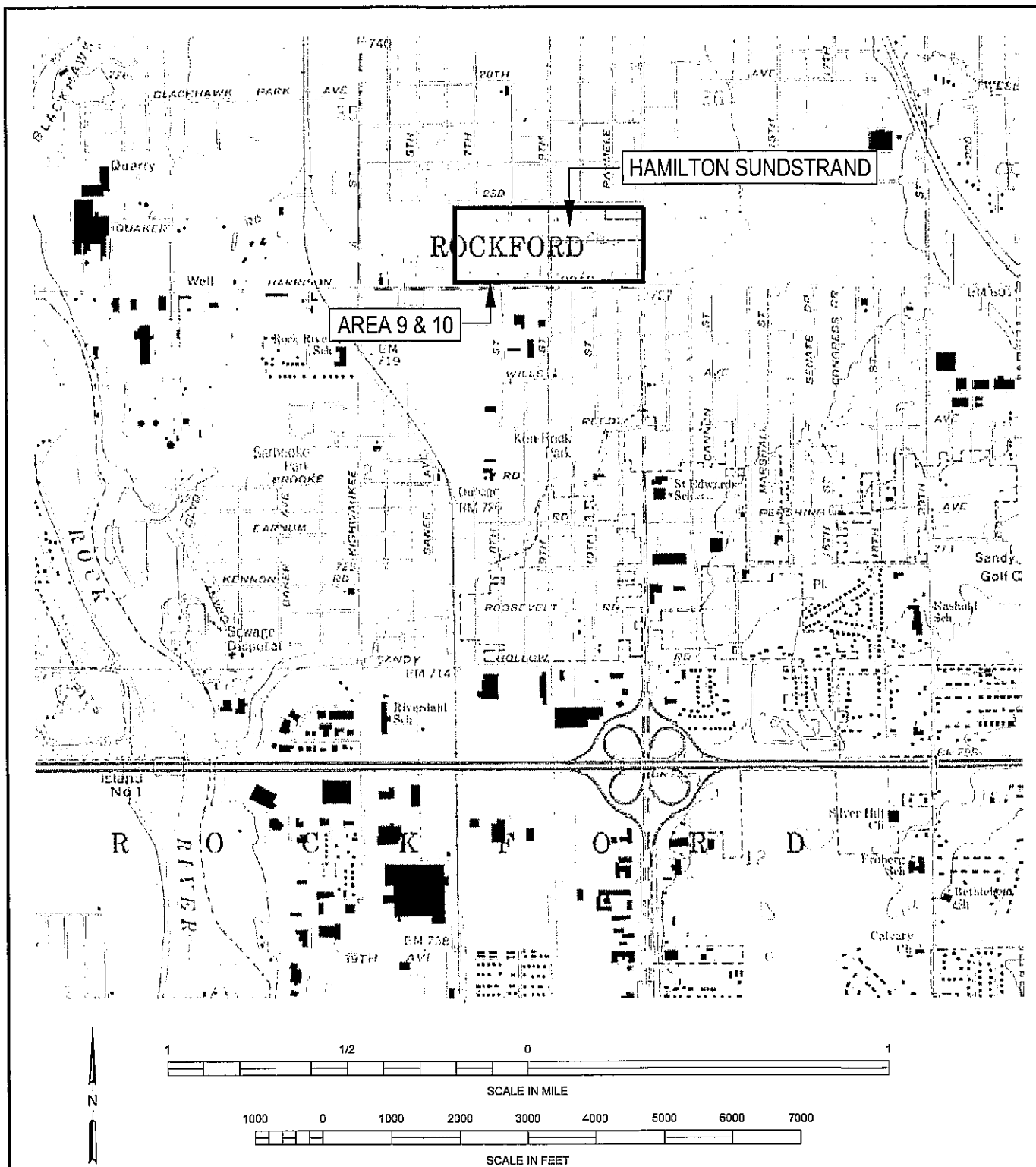
## **SECTION 1.0**

### **INTRODUCTION**


This Horizontal Groundwater Monitoring Well Installation and Testing Work Plan (HGMW Work Plan) presents the rationale, procedures, and methods for the installation, sampling, and documentation proposed for the completion of this well as part of the activities associated with Southeast Rockford Source Control Operable Unit identified as the Area 9/10 portion of the Southeast Rockford Groundwater Contamination Superfund Site (SER site) located in the City of Rockford, Illinois (Figure 1.1). The term "Site" refers to Area 9/10, an industrial area in Rockford, Winnebago County, Illinois, that is bounded by Eleventh Street on the east, Twenty-third Avenue on the north, Harrison Avenue on the south, and Sixth Street on the west.

Hamilton Sundstrand Corporation (HS) is working with the United States Environmental Protection Agency (USEPA) and the Illinois Environmental Protection Agency (IEPA) in accordance with the Administrative Order on Consent (AOC) for Remedial Design for Area 9/10 signed on January 13, 2003 and the Record of Decision (ROD) relating to source control for the SER site which was signed on June 11, 2002. The activities proposed are to be completed under Section IX Additional Work of the AOC in support of the remedial design.

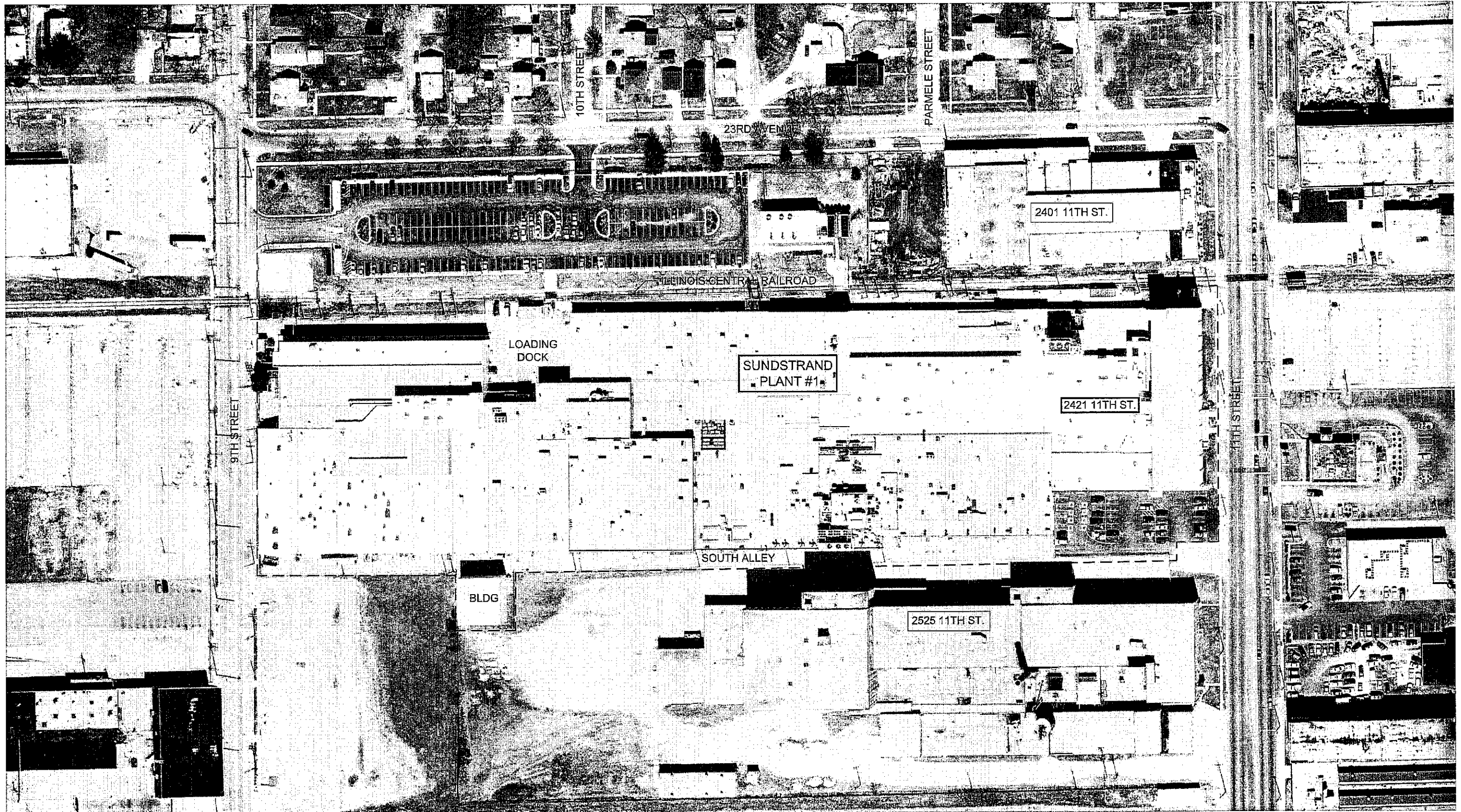
The horizontal well is proposed to be installed beneath the HS Plant #1 facility which is located within Area 9/10 at 2421 Eleventh Street. Figure 1.2 depicts a site map of the HS facility and the immediate surrounding area. The Plant # 1 building covers the majority of the HS facility. The building is used for manufacturing high precision aeronautical and aerospace components. The facility includes large equipment that is essentially immovable and subject to such minute quality assurance and quality control tolerances that drilling inside the building is not possible. This work plan provides a detailed description of site preparation, well installation, groundwater sampling, and documentation activities to be completed to aid in remedial design to address groundwater contamination beneath and downgradient of the building.



REFERENCE: USGS 7.5 MINUTE QUADRANGLE; ROCKFORD SOUTH

 <p><b>SECOR</b> 446 EISENHOWER LANE NORTH LOMBARD, ILLINOIS 60148 PHONE: (630) 792-1680 FAX: (630) 792-1691</p>	<p>FOR:</p> <p>HAMILTON SUNDSTRAND ROCKFORD, ILLINOIS</p> <p>JOB NUMBER: 13UN.02072.06.0001</p> <p>DRAWN BY: GH/KEF</p>	<p>SITE LOCATION MAP</p> <p>CHECKED BY: KTW</p> <p>APPROVED BY: DMC</p>	<p>FIGURE</p> <p>1.1</p> <p>DATE: 1-26-06</p>
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**LEGEND:**

--- PROPERTY BOUNDARY

0 120 240  
 APPROXIMATE SCALE (FEET)



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FOR: HAMILTON SUNDSTRAND ROCKFORD, ILLINOIS		SITE MAP HAMILTON SUNDSTRAND PLANT #1		FIGURE 1.2
JOB NUMBER: 13UN.02072.06.0001	DRAWN BY: GH/KEF	CHECKED BY: KTW	APPROVED BY: DMC	DATE: 1-26-06

BASE MAP DATA SOURCE: WinGIS - APRIL 27, 2001

\\s061\CADD\SE Rockford\13UN.02072.00\horizontal well plan\061 figure 1.2+1.3+2.1+3.2.dwg



## **HORIZONTAL GROUNDWATER MONITORING WELL OBJECTIVES**

The horizontal groundwater monitoring well proposed will provide valuable data to help identify the specific source area for remedial design of a horizontal soil vapor extraction and air sparging system for beneath the building. The wells will identify the baseline groundwater concentrations within the treatment area and may provide additional locations for performance monitoring of the final remedial system.

## **SITE BACKGROUND**

HS is working with the USEPA and IEPA in accordance with the AOC for Remedial Design for Area 9/10 and the ROD relating to source control for the SER site. As part of the remedial design process, some pre-design investigation has been conducted on and adjacent to the HS property. The pre-design investigation results indicated the presence of elevated concentrations of chlorinated volatile organic compounds (VOCs) in groundwater southwest of the Plant #1 facility.

This proposed effort will further define a specific target zone for remedial activities within Area 9/10 which will upon implementation address source control with respect to the Operable Unit Three ROD beneath the Plant #1 building.

## **HISTORICAL ACTIVITIES AT PLANT #1**

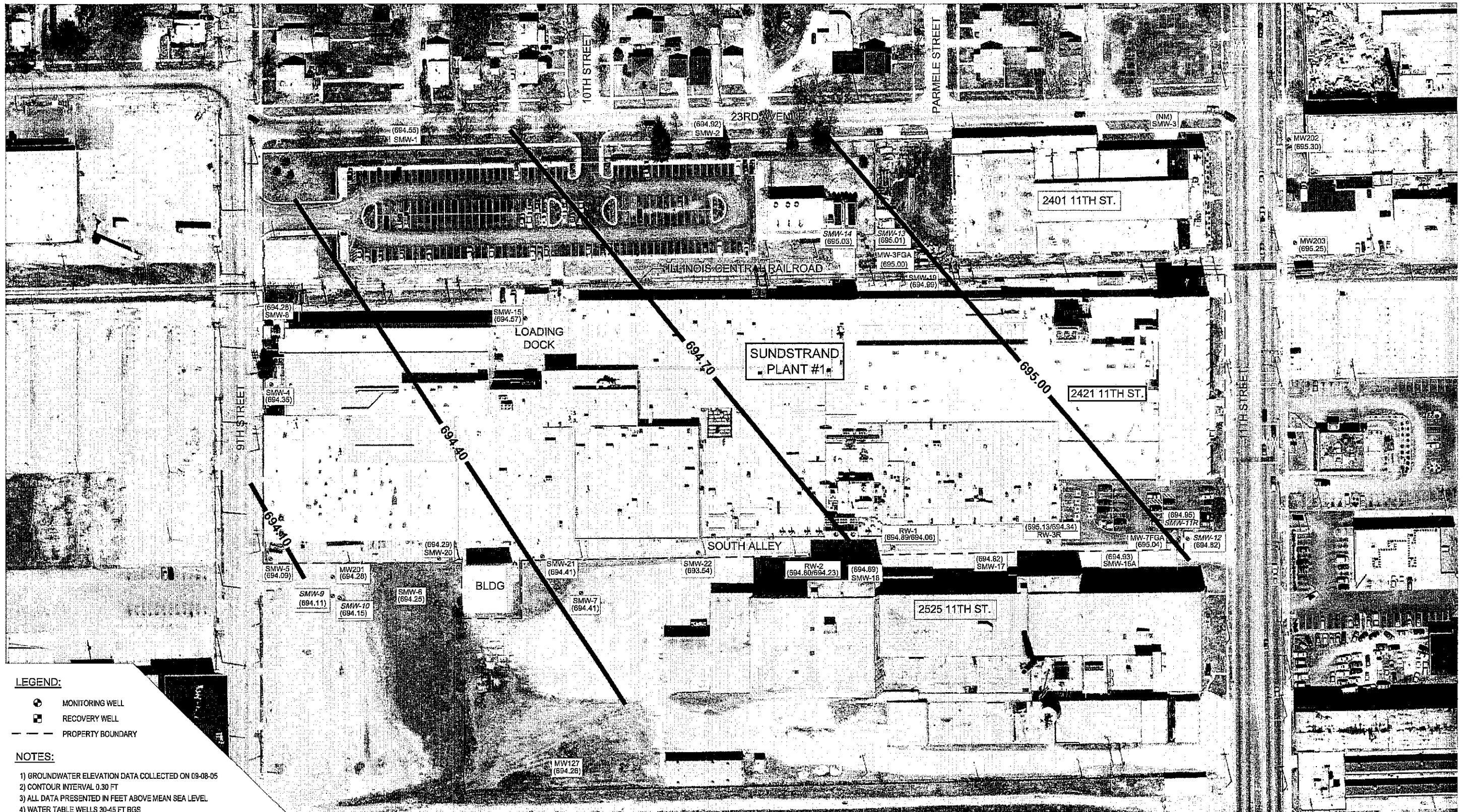
The Plant #1 facility located along 11<sup>th</sup> Street was constructed between 1913 and 1950 by Sundstrand. Building expansions over the period of 1950 to 1966 covered the western undeveloped portion of the property. In 2000 several underground storage tanks (USTs) were discovered when some equipment was added in the west central portion of the facility. At the time of the UST removal activities an incident of release associated with three of the six tanks (used oil, lubricating oil, and solvent) was determined by the Office of the State Fire Marshall representative on site at that time. The Illinois Emergency Management Agency (IEMA) was notified and release incident number 20001409 was assigned to the site.

## **SITE GEOLOGY AND HYDROGEOLOGY**

The ground surface over the majority of the site is paved with asphalt, concrete, or covered by the building concrete floor. The surface pavement and subgrade is underlain by 3 to 8 feet of silty clay. The silty clay overlies a poorly graded medium sand unit with occasional gravel layers that extends to a depth of greater than 140 feet below ground surface (bgs). The water table varies over time from approximately 30 to 33 feet bgs. A groundwater potentiometric surface map from September 2005 which was developed using data from the site monitoring well network is provided as Figure 1.3.

## **CONSTITUENTS OF CONCERN**

Based on the Remedial Investigation results and the ROD, the constituents of concern (COCs) for Area 9/10 consist of volatile organic compounds and petroleum hydrocarbons associated with jet fuel. Sampling of the Pre-Design Investigation groundwater monitoring well network identified groundwater exceeding the Preliminary Remediation Goals specified in the ROD and 35 IAC 620.410 Illinois Class I groundwater standards. The following VOC compounds were identified as contaminants in the ROD: 1,1 dichloroethene, 1,2 dichloroethane, ethylbenzene, methylene chloride, tetrachloroethene, 1,1,1 trichloroethane, 1,1,2 trichloroethane, trichloroethene, and vinyl chloride.



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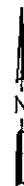
- MONITORING WELL
- RECOVERY WELL
- PROPERTY BOUNDARY

NOTES:

- 1) GROUNDWATER ELEVATION DATA COLLECTED ON 09-08-05
- 2) CONTOUR INTERVAL 0.30 FT
- 3) ALL DATA PRESENTED IN FEET ABOVE MEAN SEA LEVEL
- 4) WATER TABLE WELLS 30-45 FT BGS
- 5) MIDDLE WELLS 80-100 FT BGS (SMW-9, SMW-11, AND SMW-13)
- 6) DEEP WELLS 120-140 FT BGS (SMW-16, SMW-12, AND SMW-14)
- 7) 694.09 - WATER LEVEL ELEVATION
- 8) 694.89/694.06 - PRODUCT ELEVATION/WATER LEVEL ELEVATION
- 9) 694.11 - UNDERLINED VALUE EXCLUDED FROM POTENTIOMETRIC SURFACE EVALUATION
- 10) BGS - BELOW GROUND SURFACE
- 11) NM - NOT MEASURED
- 12) ONLY WELLS SCREENED AT THE TOP OF THE WATER TABLE (30-45 FEET BGS) USED FOR POTENTIOMETRIC EVALUATION. DATA FROM MIDDLE, DEEP, AND PRODUCT WELLS AND UNDERLINED DATA NOT USED.

BASE MAP DATA SOURCE: WinGIS - APRIL 27, 2001

0 120 240  
APPROXIMATE SCALE (FEET)



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FOR: HAMILTON SUNDSTRAND ROCKFORD, ILLINOIS		GROUNDWATER POTENTIOMETRIC SURFACE MAP SEPTEMBER 8, 2005		FIGURE 1.3
JOB NUMBER: 13UN.02072.06.0001	DRAWN BY: GH/KEF	CHECKED BY: CA/KTW	APPROVED BY: DMC	DATE: 1-26-05

## **SECTION 2.0**

### **SITE PREPARATION**

The installation of a horizontal well, and subsequent horizontal SVE and AS wells, will require offsite access, underground clearance, health and safety planning, and establishing site security and work zones for the completion of the work.

#### **OFFSITE ACCESS**

Offsite access will be required for the installation of horizontal wells. The property to the south (2525 11<sup>th</sup> Street) was purchased in December 2004 by the Amcore Investment Trust # 817776. The managing principal of the trust is Mr. Ting. Mr. Ting has been contacted regarding access for the horizontal well installation and ongoing access to the property for the use of wells thereafter.

Access is also required for the installation of the horizontal well beneath the railroad tracks and right of way north of the Plant #1 building. HS currently leases this portion of the railroad and easement from Illinois Central Railroad (ICR). ICR has been contacted regarding access for the well installation.

#### **UTILITY CLEARANCE**

Prior to mobilization and identification of the final alignment of the horizontal well, the locations and depths of public and private utilities will be identified. This will include the following: 1) contacting the Illinois one call system JULIE; 2) a review of the HS above and below grade utilities north, south, and beneath the building; 3) review of any available 2525 11<sup>th</sup> Street facility maps; 4) coordination with ICR personnel to identify private and public utilities on the railroad property; and 5) a private utility locate on the HS and 2525 11<sup>th</sup> Street properties, as necessary, in the vicinity of the proposed drilling activities.

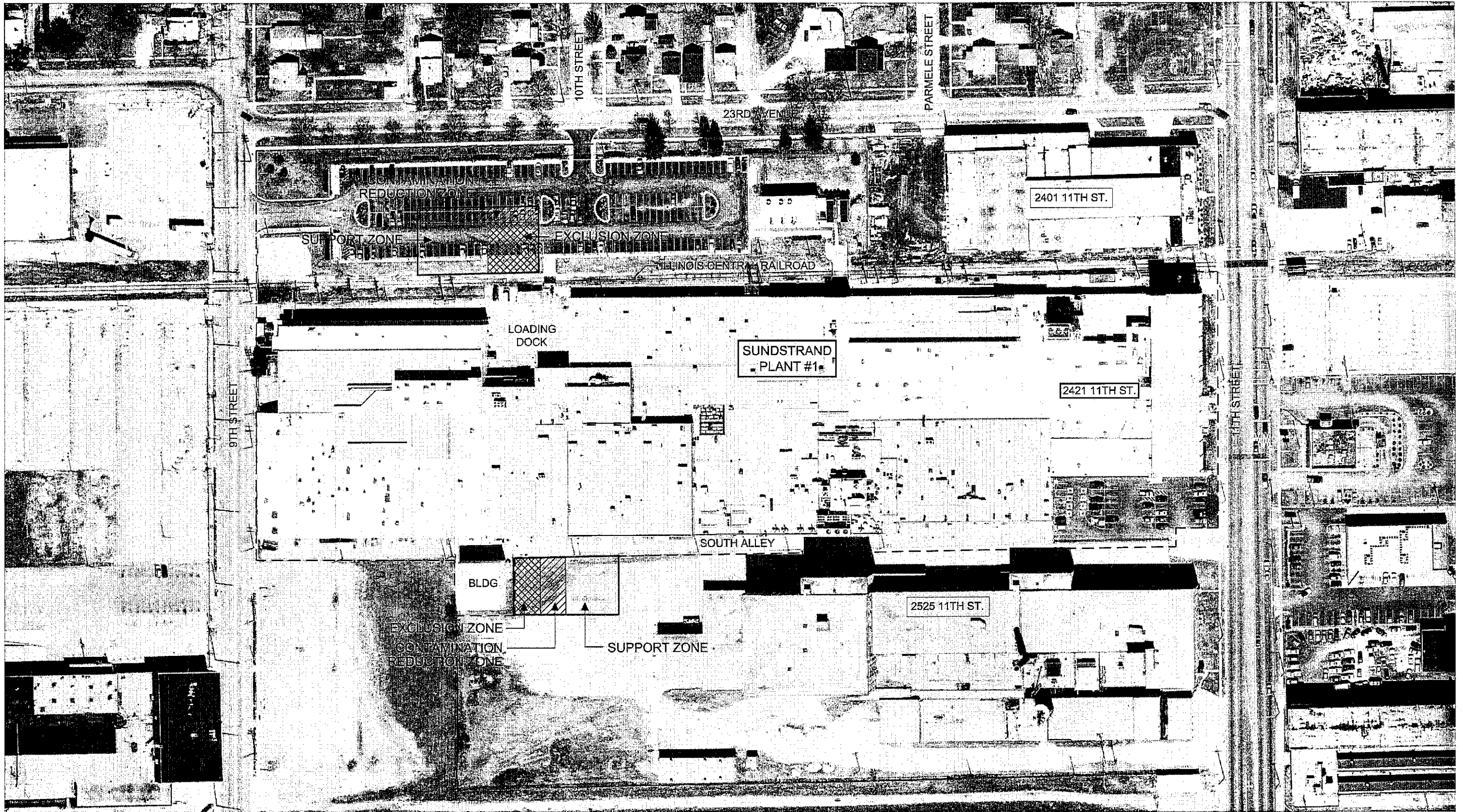
## **HEALTH AND SAFETY PLAN**

The existing SECOR Health and Safety Plan will be revised and updated to include the activities outlined in this work plan. The revisions to the plan will include additional concerns associated with horizontal drilling equipment, well construction, well development, field monitoring equipment, and activities. The plan will specify required personal protective equipment (PPE), minimum levels of protection, and criteria for upgrade PPE.



## **SITE SECURITY AND WORK ZONES**

Site security and work zones will be established. HS has security personnel that restrict access to the facility. There are guard posts located on the east (9<sup>th</sup> Street) and west (11<sup>th</sup> Street) sides of the building. The Site, as well as the 2525 11<sup>th</sup> Street property to the south are surrounded by chain link security fences. The work area north of the building will be in the parking lot area north of the railroad tracks. The work area south of the building on the adjacent property is an unpaved parking area. Temporary fencing will be used to create exclusion and decontamination zones around the work zones both north and south of the building. A site layout identifying the site security and approximate exclusion, decontamination, and support work zones is provided as Figure 2.1.





LEGEND:

-  APPROXIMATE EXTENT OF WORK ZONES
-  PROPERTY BOUNDARY

0 120 240

APPROXIMATE SCALE (FEET)



  
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FOR: HAMILTON SUNDSTRAND ROCKFORD, ILLINOIS		SITE SECURITY AND WORK ZONES		FIGURE 2.1
JOB NUMBER: 13UN.02072.06.0001	DRAWN BY: GH/KEF	CHECKED BY: KTW	APPROVED BY: DMC	DATE: 1-26-06

BASE MAP DATA SOURCE: WinGIS - APRIL 27, 2001

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## **SECTION 3.0**

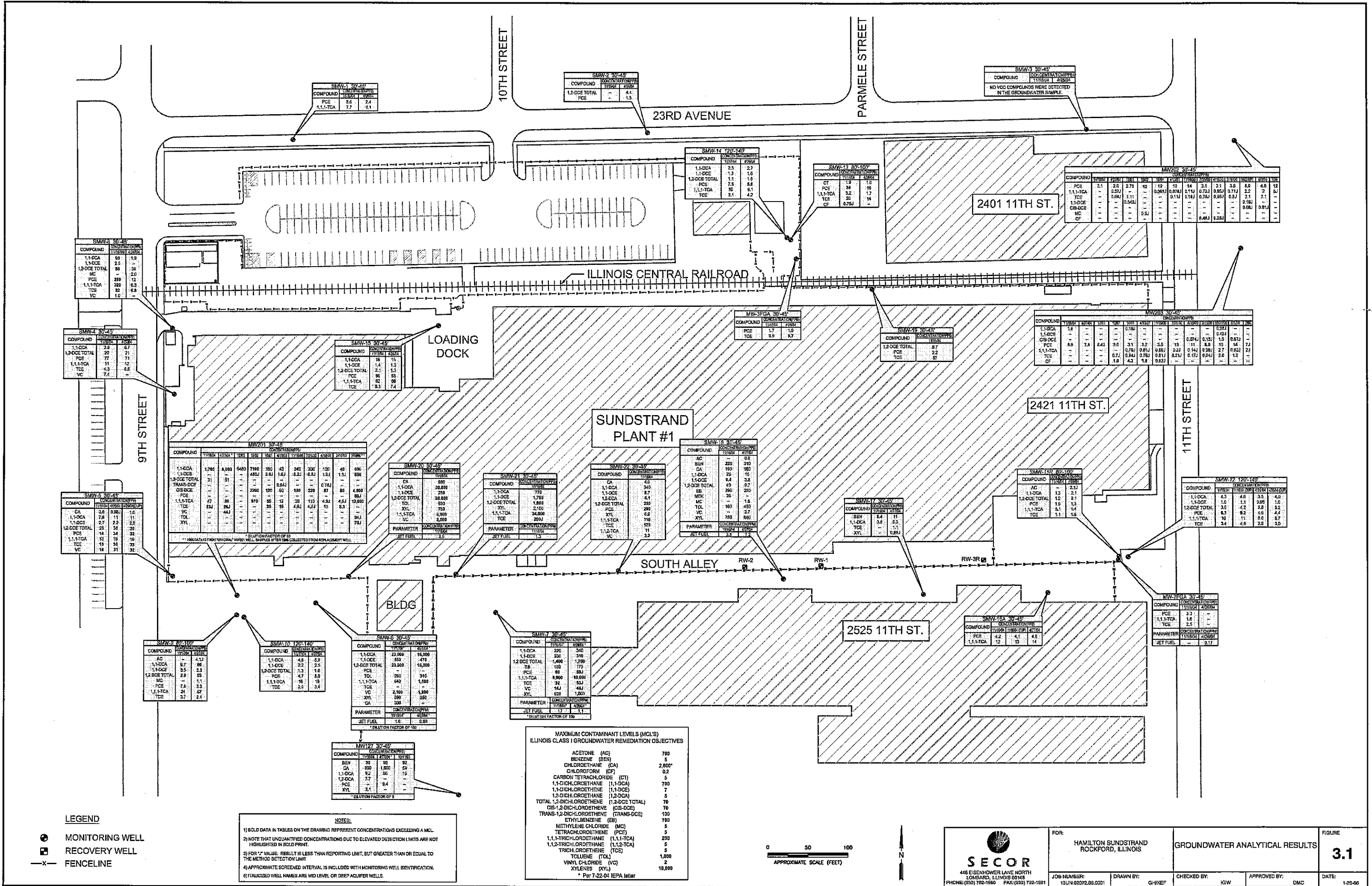
### **WELL INSTALLATION**

The proposed placement and design of the horizontal groundwater monitoring well is based in part on the data collected during the pre-design investigation. This section summarizes some of the relevant PDI groundwater information, provides details on horizontal well installation technology, and describes the types of equipment and the installation methods, well materials, well development methods, and the generation and handling of investigation derived wastes.

#### **PRE-DESIGN INVESTIGATION**

In October and November 2003 and November 2004 a sitewide subsurface investigation work was conducted to assess the condition of soil and groundwater at the Site. As a result of these investigation activities, a groundwater monitoring well network consisting of 30 wells (including 3 existing recovery wells) was established. Groundwater potentiometric level information indicates that the general groundwater flow at the Site is to the southwest as shown on Figure 1.3. A complete round of groundwater samples were collected from the monitoring well network in November 2004. The historical groundwater analytical data is presented on Figure 3.1. The analytical data from this event indicated there were elevated VOC concentrations in wells downgradient from the west central portion of the building south of the loading dock area. This is the area where several underground storage tanks had been found and removed in 2000 (LUST Incident No. 20001409). Background concentrations of a number of VOCs were also identified.

The area beneath the building is not accessible for the installation of vertical wells due to the manufacturing process and equipment. Therefore horizontal drilling is proposed as an alternative well installation method.





## **HORIZONTAL DRILLING TECHNOLOGY**

Horizontal drilling has become a proven technology for remediation purposes with significant site constraints. The drilling of a horizontal well typically begins directionally or vertically at the ground surface and then once the target depth is reached proceeds horizontally for the desired length. Monitoring and steering of drill head direction and progress is required with horizontal installations. Progress monitoring is accomplished using downhole sensing equipment such as electronic transmitters and receivers or wirelines. The two methods used for well installation associated with remediation activities are trenched and directionally-drilled.

The installation of trenched horizontal wells involves the excavation of a relatively large diameter borehole with simultaneous installation of well materials and backfill. Directional drilling of a horizontal well generally produces a smaller diameter borehole and is more similar to vertical well installation as the well materials are installed after completion of the drilling activities. A more detailed description of the directionally drilled horizontal well method is provided below.

### **DIRECTIONALLY DRILLED HORIZONTAL WELLS**

Installation of this type of horizontal well begins directionally (at some angle) and gradually changes to horizontal at the target depth. The boring progress is monitored and the drill head is steered in three dimensions. This allows the boring to be maneuvered around subsurface obstructions such as utility lines, existing vertical monitoring wells, and other subsurface features. A relatively small volume of drill cuttings is produced using this method.

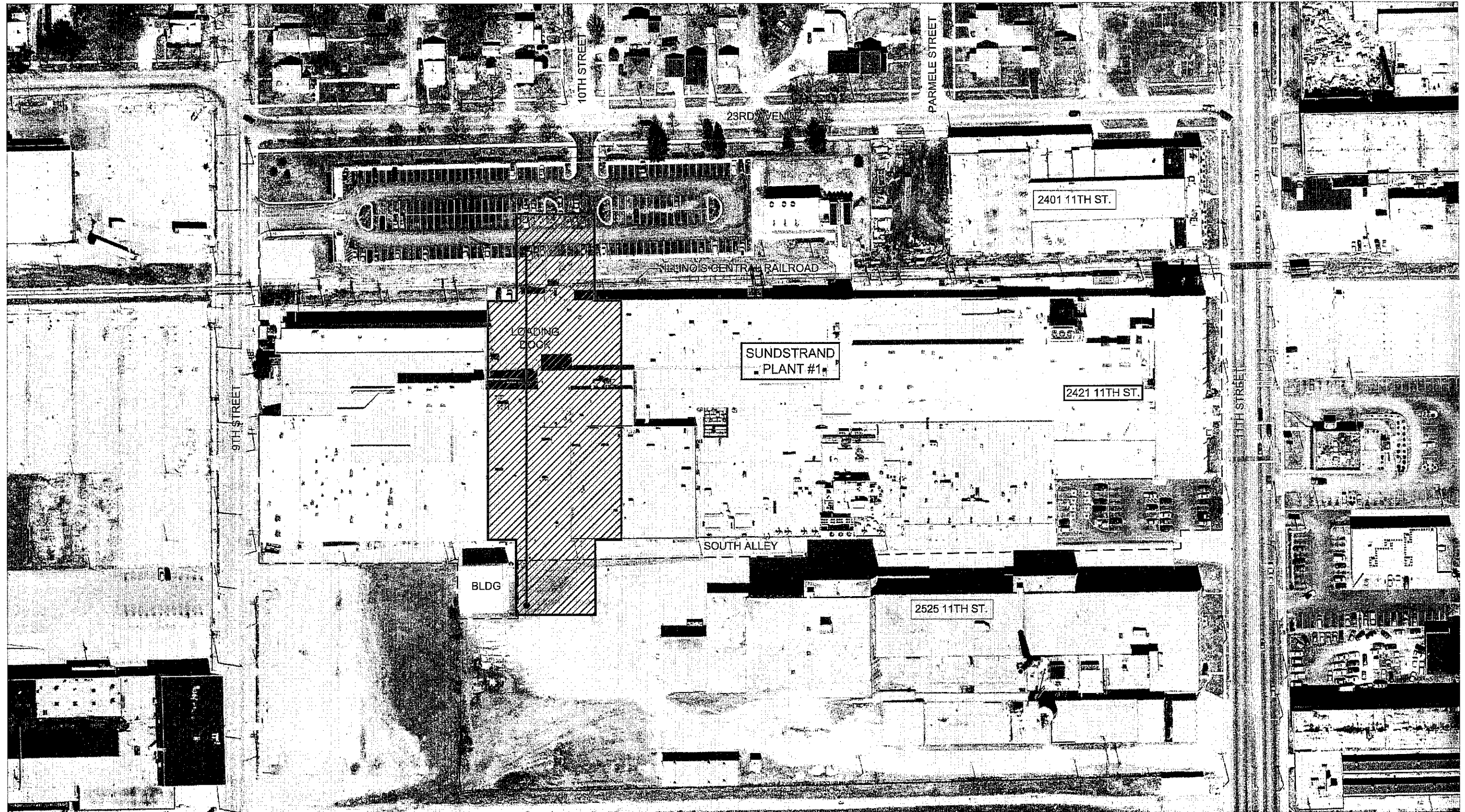
Directionally drilled wells are generally installed at depths less than 50 feet below ground surface (BGS) however there have been installations at depths over 200 feet. The tracking ability of the drill head generally decreases with increasing depth of installation. The total linear length of a horizontal well is 2 to 4 times the vertical target

depth in addition to the screen length at depth. Directionally drilled horizontal wells can be completed either as blind holes (single-end completion) or as surface-to-surface holes (continuous or double-end completion). Single-end holes involve only one drill opening with the drilling and well installation taking place through a single ground surface opening. Borehole collapse may be more likely using single-ended drilling since the hole must be left open between drilling and reaming and again between reaming and the casing installation. With single-ended completion, precise steering of the reaming tools is required to follow the original borehole path. Double-end holes, which have entrance and exit pits, tend to be easier to install since the reaming tools and well casing can be pulled backward from the opposite opening, and the hole is not left open.




Drilling fluids are used in the horizontal drilling process. A non-bentonite containing degradable drilling fluid such as CETCO Puregold CleanDrill or equivalent will be used to facilitate the removal of cuttings and maintain borehole stability.


A directionally drilled, double ended completion installation method is proposed for the horizontal groundwater well installation. The target depth of the well is 35 feet below surface grade (BSG). This will require 100 to 150 feet of linear setback on each end from the start (or end) of the screen at the target elevation. This will result in a borehole that is 400 to 500 feet in length. A plan view of the proposed horizontal well alignment is provided as Figure 3.2. The horizontal well location selected would be on the downgradient margin of air sparge and soil vapor extraction system treatment zone currently envisioned.

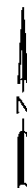
The process for horizontal well installation has essentially three steps: 1) a pilot borehole is drilled; 2) the pilot borehole is reamed to a larger diameter; and 3) the casing and screen material is pulled back through the borehole. The drill rig is typically a small foot print machine (Vermeer or equivalent). The drilling fluid is mixed in a separate container and continuously supplied to the rig as drilling progresses. Spent drilling fluids are collected at both the entry and pit areas excavated at both ends of the boring. The drilling fluids are collected in the pits and pumped to a holding container. A



LEGEND:

-  PROPOSED HORIZONTAL GROUNDWATER MONITORING WELL ALIGNMENT
-  HORIZONTAL SVE AND SPARGE WELL CORRIDOR AND TARGET ZONE
-  PROPERTY BOUNDARY

0 120 240  
  
 APPROXIMATE SCALE (FEET)



  
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FOR: HAMILTON SUNDSTRAND ROCKFORD, ILLINOIS		PROPOSED HORIZONTAL WELL ALIGNMENT AND TARGET ZONE		FIGURE 3.2
JOB NUMBER: 13UN.02072.06.0001	DRAWN BY: GH/KEF	CHECKED BY: KTW	APPROVED BY: DMC	DATE: 1-26-05

BASE MAP DATA SOURCE: WinGIS - APRIL 27, 2001

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bentonite surface seal will be installed at both ends, and a flush mount vault set in concrete will be constructed where the well casing exits the ground.

Based on a preliminary site walk over, there appears to be some electrical interference north of the building (perhaps associated with overhead electric lines) that may make tracking the signal from the drill head in this area more challenging to identify. Use of a wireline tracking method may be required as opposed to the more typical walkover methods.

## **WELL MATERIALS**

Materials available for use in horizontal wells are essentially the same as those for vertical environmental wells. Additional factors for consideration in the choice of well screen and casing materials to be used with horizontal wells include axial strength, tensile strength, and flexibility.

Materials available for well and casing include:

- Fiber reinforced plastic (FRP);
- Fiberglass reinforced epoxy (FRE);
- High density polyethylene (HDPE);
- High temperature polyethylene (HTPE);
- Polyvinyl chloride (PVC);
- Stainless steel;
- Porous polyethylene well screen.

Screen packing materials that may be used with horizontal wells include:

- Natural formational material pack;
- Pre-packed screens;
- Sand and/or gravel; and
- Geotextile (filter fabric).

A 200 foot long screen section with approximately 200-300 feet of entry and exit casing is proposed. The well material proposed is HDPE which has good chemical resistance, good tensile strength, and sufficient flexibility. The screen and casing proposed are four inch diameter pipe. The screen slot size proposed is 20 slot (0.020 inches). The filter pack will be from collapse of the formational sand.

### **WELL DEVELOPMENT**

After completion of the borehole and installation of the well materials the well will be developed. The well will be flushed with water and then, as necessary, with a water solution containing compounds or enzymes (depending on the type of drilling fluid) to break down the drilling fluid remaining in the formation. The injected material is typically left in place for a period of time (generally 12-24 hours) before being pumped from the well. The well screen is then jetted with water prior to pumping to complete well development.

### **DECONTAMINATION**

A temporary decontamination pad will be established in a paved area in the vicinity of the entry and exit locations north of the building in the parking area and in the south alley. A pad made with impermeable polyethylene sheeting will be placed on the asphalt and sloped for water collection. The drilling equipment will be decontaminated using a steam cleaner and/or pressure washing equipment. The decontamination water will be containerized and staged within the decontamination or exclusion zone. Upon project completion, the wastewater will be characterized, transported offsite, and properly disposed at a HS approved facility. All soil from decontamination activities will be disposed along with the site soils.

Work-generated solid waste (used PPE, plastic sheeting, etc.) will be visually inspected. If inspection indicates the materials may be contaminated, it will be disposed along with the waste material. If no evidence of contamination is present, the materials will be

double bagged (trash bags) and disposed in an onsite dumpster for ultimate disposal in a sanitary landfill.

### **INVESTIGATION DERIVED WASTE**

Wastes associated with the well installation, well development, and decontamination will be properly characterized and disposed at a HS approved facility. The wastes will consist of drilling fluid, soil cuttings, and wastewater. This will result in two waste streams (liquid and soil). The liquid wastes from the drilling fluid will be decanted and disposed along with the groundwater from well development. The solid material from the drilling fluid and soil cuttings will be dried or solidified and disposed. Waste characterization profile samples from each waste stream will be collected. The waste characterization samples will be analyzed and the results submitted to the hazardous waste disposal facility for acceptance. It is anticipated that the material will be manifested and shipped under either a characteristically hazardous waste code F002 or as a non-hazardous special waste. The actual waste code and disposal method, including treatment if necessary, will be determined by the characterization analysis.

### **HAZARDOUS WASTE DISPOSAL**

Any waste determined to be hazardous will be shipped to a HS approved hazardous waste disposal facility. HS has contractual agreements with a number of disposal facilities. Once final selection of the disposal facility is confirmed and the waste is accepted for shipment, SECOR will provide this information to the USEPA in accordance with Section XI of the AOC.

## **SECTION 4.0**

### **GROUNDWATER SAMPLING**

After well installation and development, groundwater samples will be collected from four locations within the screened portion of the horizontal well. It is anticipated that the primary access to the well will be from the north side.

#### **GROUNDWATER PURGING AND SAMPLING METHODS**

The groundwater purging and sampling procedures will be as follows: A low flow or variable rate submersible pump will be placed in the horizontal well and will be moved to the target locations using a stainless steel line or fish tape. Four sample locations at evenly spaced intervals within the well screen are planned. The pump discharge will be connected to small diameter (1/4 to 3/8 inch) disposable polyethylene tubing. A low flow groundwater sampling protocol will be used. Purging will be performed until water quality parameters stabilize. An inline flow through cell monitoring device will be used to monitor these parameters. At a minimum, at least one volume of the length of tubing will be evacuated. The sampling will progress from the nearest location to the well head to the furthest location. A new length of tubing will be used for the collection of each sample. These groundwater sampling procedures are a modification of those provided in the Field Sampling Plan to account for the unique attributes of horizontal wells.

#### **ANALYTICAL METHODS**

The samples will be submitted to STL Laboratories in University Park, Illinois for the target analyses (VOCs by USEPA Method 8260 and TPH DRO by USEPA Method 8015B). TPH DRO analysis (for jet fuel) is included as low levels of TPH were detected at the SMW-6, SMW-20 and SMW-21 locations located downgradient of the proposed horizontal well location. Samples will be prepared, packaged, and preserved in the same manner described in the approved Field Sampling Plan for groundwater samples. One duplicate sample will be submitted for Quality Assurance/Quality Control (QA/QC). The laboratory will run and report MS/MSD analyses on a 1 per 20 sample basis (1 sample). One field sampling blank will be collected. A trip blank will accompany each

shipment of samples sent for analysis.

The samples will be identified using the following nomenclature which has been slightly modified from the Field Sampling Plan (FSP) protocol.

RD – HW1– MMY –N150

Where:

RD = Remedial Design

HW1 = Horizontal Well 1

MM = Month

YY = Year

N150 = 150 feet from sampling point  
north side (or S150 if from south side)

### **INVESTIGATION DERIVED WASTE**

The liquid waste from the groundwater well purging and associated decontamination activities will be containerized. The material will be managed appropriately and disposed as hazardous waste either in conjunction with the well development liquids or following a similar procedure.



## **SECTION 5.0**

### **DOCUMENTATION**

After completion of the horizontal well, groundwater monitoring well installation, and sampling activities, a summary report documenting the work will be prepared.

#### **DATA REPORT PREPARATION**

The report will consist of a brief narrative of the horizontal well installation activities, well development, groundwater sampling procedures, and a summary of the groundwater analytical results. The report will include a boring log of the horizontal well, figures showing the location of the well in plan and cross sectional view, presentation of all analytical data in tabular format, a comparison of the analytical results with the ROD and TACO ROs, and disposition of the investigation-derived waste transported offsite. The following provides additional description of several key portions of the report.

#### **HORIZONTAL WELL INSTALLATION**

A narrative of the installation process and procedures will be prepared including the equipment used; the drilling fluid(s) used; well screen material, slot size, and length; well casing material and length; filter pack material, and type of surface completion. A boring log and horizontal and vertical alignment figures will be provided.

#### **WELL DEVELOPMENT**

A description of the well development process will be prepared including the procedures used, equipment, volume of water removed, and development water quality data. A well development log will be provided.

## **GROUNDWATER SAMPLING AND ANALYTICAL RESULTS**

The groundwater analytical results will be summarized and compared to the ROD and TACO ROs. The laboratory analytical reports will be included in the document as an appendix.

## **INVESTIGATION DERIVED WASTE DISPOSAL**

The volumes and types of waste generated as part of the installation, development, and sampling efforts will be summarized. The manifests for the transportation and disposal (and any treatment as necessary) will be provided as appendices to the report.

The proposed horizontal groundwater monitoring well installation and resulting analytical results will provide valuable information in the identification of potential source areas within Area 9/10. The data generated as a result of activities presented in this work plan will assist in determining specific target areas for the remedial design. The horizontal well may also be used as part of the remedial design for performance monitoring purposes.